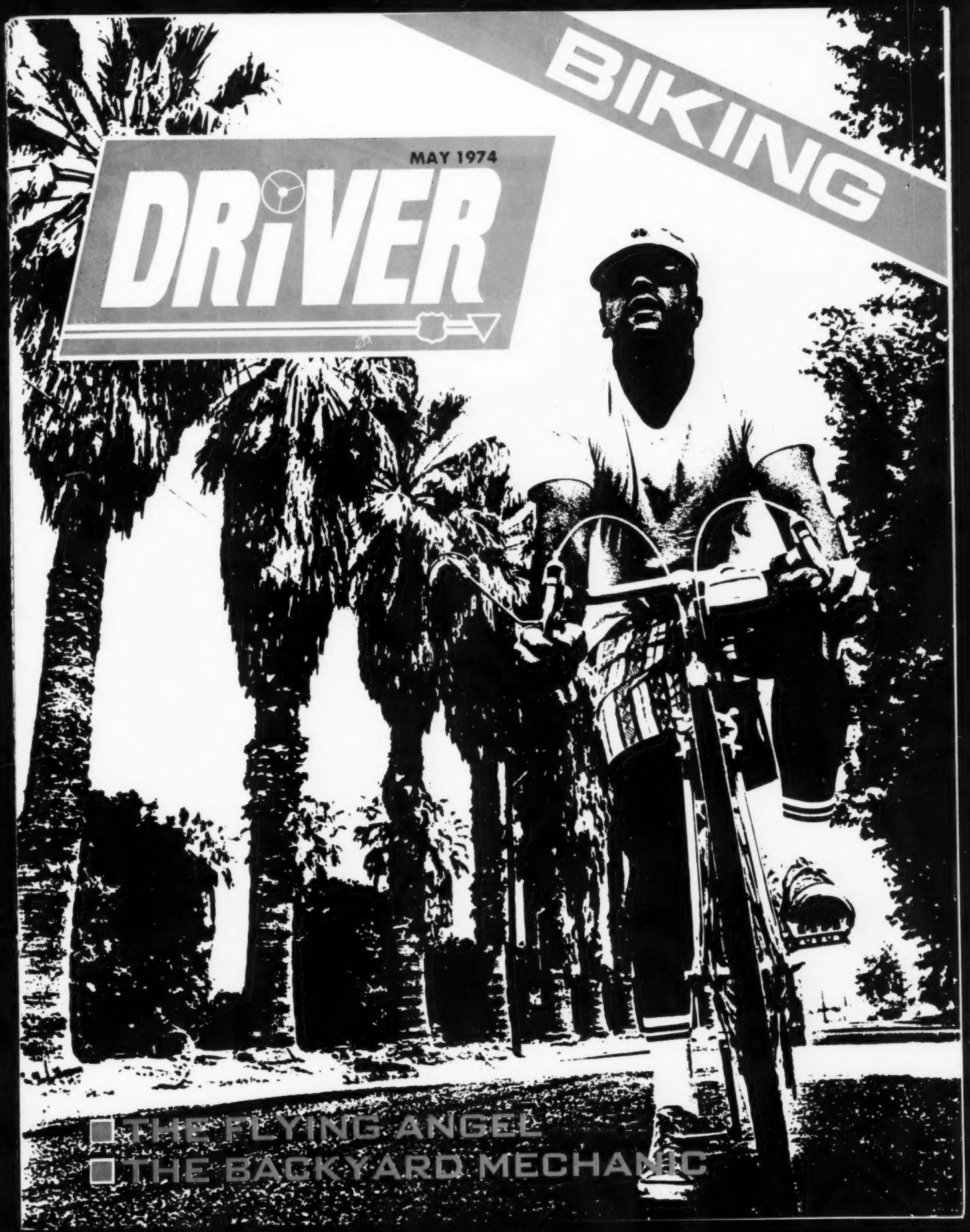
BIKING
MAY 1974
DRIVER
THE FLYING ANGEL
THE BACKYARD MECHANIC

DRIVER

ONLY

BIKE

Bike routes through town can be established for the cost of some paint and labor—offer the rider greater safety. Riders must still be alert for motorists making right turns who must cross through the bike lane to do so.

PEDALING ALONG

If you're thinking of joining the bicycle crowd, this one is for you

A lot of interesting people have taken up cycling.

You say you tried car pooling but you can't stand all that early morning chatter and cigarette smoke? Well, there's another way to commute — cheaper, quieter, and guaranteeing lots of fresh air. Get a bicycle.

The fuel crisis has been responsible for an increase in bike sales, but the fact is that bike riding was the in thing long before gasoline turned up on the six o'clock news. Americans bought 13 million bicycles last year, and most of them weren't for the kiddies.

It's a funny thing about the bicycle "happening" — nobody saw it coming. Probably it started with college students, who liked the expression of individuality a bicycle represented and who couldn't afford to buy and maintain an automobile anyway. About the same time, people who could afford to buy and maintain two or three cars decided they needed exercise, and bike-riding looked like a lot more fun than jogging. They discovered that in addition to getting exercise, they were seeing things while pedaling along — like trees and grass and the houses in the next block — that they had been missing for years while encased in their automobiles. They spread the word.

Then along came the environmentalists, who were more than willing to put some leg muscle into their fight against tailpipe pollution. All of a sudden, there were 75 million bicyclists in this land of Henry Ford.

CHOOSING A BICYCLE

If you haven't paid much attention to bicycles since you gave up your paper route, you may be surprised at how much they've changed. When shopping for a new one you'll find an amazing array of choices, but you will probably select from three types — a one-speed, a three-speed, and a ten-speed.

- The one-speed is commonly called a *middleweight*. With a heavy frame, fat balloon tires, and a coaster brake that operates on the rear wheel when the pedals are pushed backward, this bike is the one most of us remember as our first "two-wheeler." It is very sturdy, dependable, easy to maintain and ride, and is usually best for anyone who gives his bike rough use. Middleweights typically weigh 50 to 60 pounds.
- *Lightweights* are popular bikes with adult riders. They are much lighter than middleweights, weighing around 45 pounds, and come most often with a

continued

DRIVER

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

MAY 1974

VOLUME 7 NUMBER 12

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THE EDITOR SPEAKS

DOUBLE CLUTCH

BETTER NOT IDLE

Have you been in a line of cars lately — maybe at a gas station or the drive-up window at the bank — and wondered if you should let your engine idle or keep shutting it off and restarting it?

Nobody cared much until lately, but now it's a question in everybody's mind. So Ford ran some tests to find out. Using a standard 1974 Ford 351-cubic-inch V-8, the engineers at the engine division test labs found that when an engine is going to idle for more than 30 seconds, less gas is required if it is shut off and restarted.

The test engine used 3 4ths of a gallon of fuel per hour at normal idle speeds. That's .0125 gallons per minute. When the engine was warm, it took .005 gallons to start. This means that an engine can be started twice a minute and still use less fuel, on the average, than required to run it at idle during the same one-minute period.

Ford ran a test to simulate conditions for a car waiting in line at a gasoline station. The engine was started up for 30 seconds to idle forward, then shut off and restarted after three minutes to move forward again. Under these conditions, the engine used less than 1 4th of a gallon of gasoline per hour — again much less than the 3 4ths of a gallon used when the engine was left at idle.

Other engines may use more or less fuel in idling and starting than this particular V-8, but the relationship of fuel usage should not change.

So the advice is: Don't idle.

NEXT MONTH
DRIVING IN SEATTLE

This unique bicycle is the Harris Vertical, designed by Trevor Harris, who is noted for his automobile chassis design. On this bicycle, the pedals are operated up and down, not around a sprocket. This method of pedaling provides torque at the driving wheel during the entire pedal stroke and takes advantage of the great pushing power of the human leg. (Not yet on the market.)

three-speed hub that facilitates gear changes while riding. First gear is best for climbing hills or riding into a stiff wind. Second gear allows for a steady speed on level ground with minimal effort. Third is used for going downhill or riding with the wind. Brake-levers mounted on the handlebars work separately on the front and rear wheels and require some getting used to for smooth, effective stops.

■ *Derailleurs* can weigh as little as 22 pounds. Like the lightweight variety, they have hand-lever brakes mounted on the front and rear wheels. The handlebars are the downswept style made popular by racing bikes. A derailleur may be purchased that has a frame size of 19 to 25 inches. (The frame size is measured from the crank hanger to the seat post.) In these sizes, bikes are available with five, ten or even fifteen speeds. The ten-speed is the most common and is the bike that is most responsible for the current enthusiasm for cycling.

Derailleurs are mechanically precise, requiring regular maintenance for top performance. Their gears work on the outside of the wheel hub, by way of a complex *derailleur* (or derailer) mechanism. This is an assembly that keeps the overlong chain under tension and derails it from one rear sprocket to another. There are five sprockets in the rear, and one, two or three in the front. The front sprockets, mounted side by side as the rear ones are, also work by derailment. A wide variety of sprocket sizes is available, allowing the rider to pick and choose the group of gear ratios that best fit his requirements.

The downswept handlebars call for a bent-over riding position that is much more comfortable than an upright one — once you get used to it. These bikes are good for long-distance touring or any riding where there is widely varied terrain. With one drawback — their inability to take much rough use — they are probably the best bicycle for all-around riding.

WHAT DO YOU NEED?

Before you buy, think about the use you'll be making of the bike. If you want it just to ride around the neighborhood, a three-speed is the most you need so why waste your money on more? But for country cycling or city commuting you should get a 10-speed. Going up a hill in the old days you had to stand up and pump for all you were worth because your bike had only one gear. On a ten-speed the gears will make the work much easier. But for that kind of riding, fewer gears probably aren't enough, and more than ten may well be too many.

Now comes the big question. How much to spend? A good, all-purpose 10-speed probably will cost you at least $120 retail. Bikes costing over $1,000 are not unheard of, and even for what you want, the price can go up to over $400. Usually, the more expensive the machine the lighter the weight. Lightness is something one pays dearly for in a 2-wheeler.

Road & Track road-tested the Maserati MT-3 for its April issue (yes, the Italian car family does make bicycles) and found they got exactly 20½ pounds of machine for $545. This is a racing model bike (somewhat more fragile than a touring machine) and not the kind you'd want to jump a curb with. To further impress you with the fact that bikes are no longer kid stuff, we might mention that nearly all the running gear on the Maserati MT-3 is by Campagnolo, a name you probably know as the maker of wheels on fine Italian cars.

No matter what price-range bike you are looking at, you will want to check the frame. Welded frames are found in the cheaper bikes. They are not as strong as lugged frames. Lugged frames are brazed so that steel or alloy tubing can be thinner than the heavy steel needed to make a welded joint. Alloy frames are the most expensive and the lightest. Some are made with double butting and weigh just over 20 pounds. The average person doesn't need this refinement. A good lugged straight steel frame weighing as much as 30 pounds will do a good job.

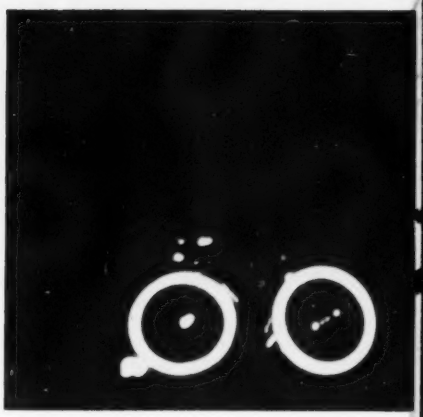
In any event, when examining a model you particularly like, check the manual accompanying it for the tube dimensions, type of steel used and whether it is double-butted or straight gauge in construction. Should this information not be available in the manual, check with the dealer. If he isn't sure, look for a dealer who knows his merchandise.

Next, take a look at the front forks — they should be equal in length. If they are different, move on to another bike. Also check alignment of the forks. They should be equally spaced on either side of the front wheel. By looking

continued

Bicycles are prime targets for the rip-off artists, so people come up with lots of interesting ways for locking up. Actually, no device that can be cut with a bolt cutter, the thief's favorite tool, can protect your bike.

The derailleur's one drawback is that it cannot take rough use. Never jump it off a curb or over railroad tracks.



The bike flag or beacon is becoming a popular item. It warns of the rider's presence even when he is hidden by traffic, dips or obstructions.

There are hundreds of variations in two-wheel bicycles. Start out your shopping with a clear idea of what you want to do with the bike.

head-on at the frame from the front, the prospective buyer should be able to see but one set of tubing, the others being in complete alignment. If not, the frame probably is not sound.

GET A FIT

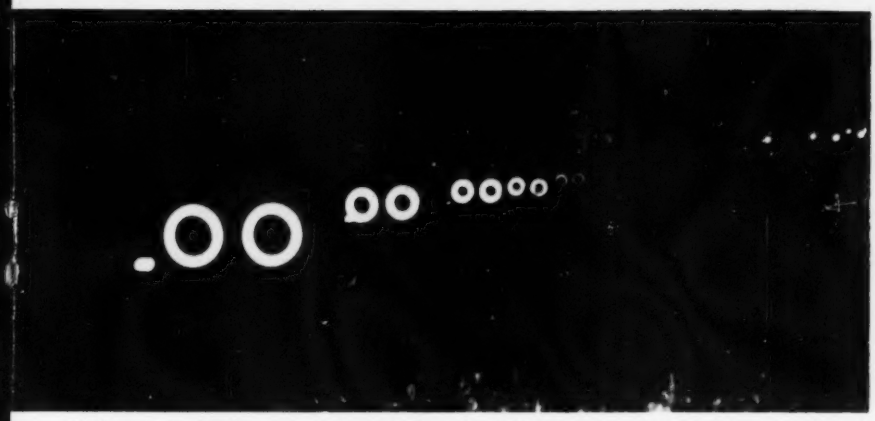
Many new riders are surprised to hear that a bike must be bought to fit them. Many people choose bicycles that are too large in frame size. A quick check is to straddle the bicycle. The top tube should reach to within an inch of the crotch when you are standing with your shoes off. Don't worry about how the pedals and seat reach; the seat can be raised or lowered. But once you own the bike, there is nothing you can do to change the frame size.

Next, look at the front rim. If it is made of steel, figure that it will be heavier and more shock transmitting than aluminum types, but not so easily damaged. Check the spokes. Good, but expensive, types are butted stanless steel, virtually rustproof and somewhat stronger than others. Are the spokes three or four-crossed, woven or soldered? The latter two add strength and absorb some road shock.

Check the wheels for out-of-roundness by lifting up the frame and spinning them. They should revolve at an equal distance from the caliper brakes.

DIFFERENT TIRES

There are two types of tires: sew-ups and clinchers (or tubulars). Sew-ups have the tube sewn directly to the tire casing. They make for smooth and lively riding and are lightweight, but difficult to patch if you have trouble on the road.



Lights and reflectors are extremely important if you are going to ride your bike at night. The best thing about the wheels in this nighttime photo is that the motorist not only will see you but will immediately recognize that you are riding a bicycle.

Clinchers get their name from what they do: they clinch the rim. They take regular tubes, which are easier to patch but more difficult to remove from the rim without tire damage. They are heavier and have more tread than the sew-ups, which reduces the chance of blow-out or puncture. It's a matter of personal preference, but the sew-ups are really for the more serious biker.

Take a look at the brakes. Center-pull caliper brakes are found on many machines and get their name because even pressure is applied to the rim on both sides when the brake lever is squeezed. The side-pull caliper brake also is used widely, but it exerts a pressing force only on one side of the rim. Properly adjusted brake levers should not travel more than two or three inches before clamping the brake surfaces on the rim.

Pedals on a good 3-speed utility bike are often rubber, and that's fine. On 10-speeds, they are most often steel, although some are aluminum. They are usually "rattrap" — serrated to hold the foot in place. Be certain not to buy any bike with plastic pedals. It is too easy for your foot to slip off.

Steel toe clips can be affixed to the pedals and, while you may not like them at first, you will find that they keep the foot properly placed on the pedal. The ball of the foot should be placed directly over the pedal. Leather straps further secure the feet in place and look much like stirrups on a saddle. If you are riding in traffic areas where signal lights make frequent stops necessary, only one foot should be strapped in. This leaves one foot that, while clipped in, is able to be pulled free to steady the bike on stopping.

When you first begin to ride your bike, you may hate the seat (usually called the saddle) and want to change it. But remember that on a 10-speed the rider assumes a forward lean with the body and the seat will aid you in maintaining the best position. Seats have been carefully engineered, which you will realize as you gain riding experience. On a 3-speed, which allows a more upright position, it's all right to change to a more comfortable seat.

The crank — the part you are actually turning with your legs — is another important item. You will probably want a three-piece crank set. A one-piece unit has to have a big heavy housing and it can wallow. It's best to have a small housing for better bearing fit. Three-piece sets are machined; one-piece units are stamped out.

(In more expensive bicycles, the crank is aluminum and cotterless. If you should buy such a bike, be sure to buy a crank tool before leaving the shop. You will need to tighten the cranks every 20 miles for the first few hundred miles. Otherwise the steel axle will gouge into the soft aluminum and ruin the cranks.)

WHERE TO BUY

If you are going to buy a new bicycle, naturally you will shop with dealers who have good reputations in the community. A modern bicycle requires maintenance and novices will need the help of a serviceman, who will be found at the dealers. Of course it isn't necessary to buy a new bike. The classified ads of local newspapers nearly always carry listings of used bicycles for sale or trade and if you are armed with a little knowledge you might find it fun to check some out. If you are looking for a good, functional middleweight, a flea market or swap meet provides a good selection for about $10. A good clean-up and some oiling plus a paint job may be all it needs.

Police departments often have regular auctions to sell the bikes that either were lost or stolen.

SAFETY EQUIPMENT

In almost every area, bicycles have equal rights with automobiles on city streets. Therefore, one of the biker's biggest problems is one he shares with the motorcyclist — being visible to motorists. Lights and reflectors are a vital necessity at night, on any road, anywhere. Rear lights are especially important, and these should be clearly visible to overtaking traffic from at least 300 feet away. Just remember that the largest taillight is the best; it should be visible from the rear and both sides.

Reflectors are a safety back-up to lights. The bigger the reflectors, the better. Use a three-inch diameter round reflector. Another good reflector is pressure-sensitive tape. Stick strips of this tape on the back of cycling shoes, on fenders, belts, helmet, frame, pedals and handlebars.

Try to choose your riding clothes for high visibility. Air Force people riding in uniform may wear a reflectorized vest over it. (AFR 127-5 is now being revised to allow this.) These are made of light-reflective or phosphorescent yellow or orange, are lightweight and comfortable. They are available in motorcycle shops.

Many types of gloves are marketed for the cyclist, and the serious rider should not overlook getting a pair. They give much better grip on the handlebars than sweaty hands and they will save the skin on your palms when you fall.

Some riders who use their bicycles for commuting wear the same crash helmet they use for motorcycling, and for the same reasons. Again, you may wear the helmet with your uniform. Your alternative is to wear your uniform hat. Regulations do not allow you to ride bare-headed if you are in uniform.

Another inexpensive visibility device is the bike flag. If you haven't seen one, it looks just like the flag in the cup on the golf green. It can be mounted easily, even positioned horizontally. The flag rides high above the bicycle and signals the rider's presence even when he is hidden by traffic, dips or obstructions. The flag should be a brilliant color and the staff made of a light metal or fiberglass for strength without weight.

If you are riding in civilian clothing, you may want to invest in a belt and cuff straps with large, colored reflectors.

continued

Reflectorized pedals are a good "visibility" item for riding after dark. Front right is a two-way lamp that straps to the leg.

A good seat for a small passenger should be heavily constructed with good padding. It bolts to the rear of the bicycle seat and the frame, never in front. The child should be strapped in, the rider especially cautious.

When you first try this saddle, you may decide to give up bicycling altogether. But you'll get used to it. The seat is carefully engineered for riding comfort and efficiency, is not really meant to carry all your weight. Arms and legs distribute some of the body weight to other parts of the frame.

Late next fall, Firestone will begin marketing reflective bicycle tires. Working with the 3M Company, they have found a method for sandwiching a reflective strip of tiny glass beads on an aluminum backing and applying it to the sidewall of the green tire before it is cured. After dark, the two large reflective circles will show up in the motorist's headlights and give him quick identification of a bicycle.

If you are going to commute by bicycle in all kinds of weather, you probably should consider rain rims. They are simply rims on which the braking surfaces are covered with small indentations so the water will have someplace to go and the blocks can grab with a minimum of slippage even when wet. Remember, these aren't foolproof. You must still be extra cautious when riding in wet weather.

GETTING THE FEEL OF IT

Before taking your new bike out on the street, set yourself up a practice period on an empty parking lot or similar smooth, unobstructed area. The gearing mechanisms on a 5, 10 or 15-speed bicycle are complicated appearing at first and take a little getting used to. Unlike an automobile with a manual shifting stick, there are no specific notches that the shifters engage, which is why shifting takes practice.

Models vary, but usually the right-hand shifter dictates performance of the rear sprockets, while the left-hand shifter affects the front sprockets on the chainwheel. In this case, moving the right-hand stick forward will engage a higher gear, as will moving the left-hand shifter rearward. Using the same principle, moving the shifters in the opposite directions will engage lower gears for easier pedaling.

Upon making the first shift, the novice rider can expect to hear a curious variety of sounds, all of them signalling the shift was made incorrectly. When you make a shift correctly, there will be no sound. It takes practice.

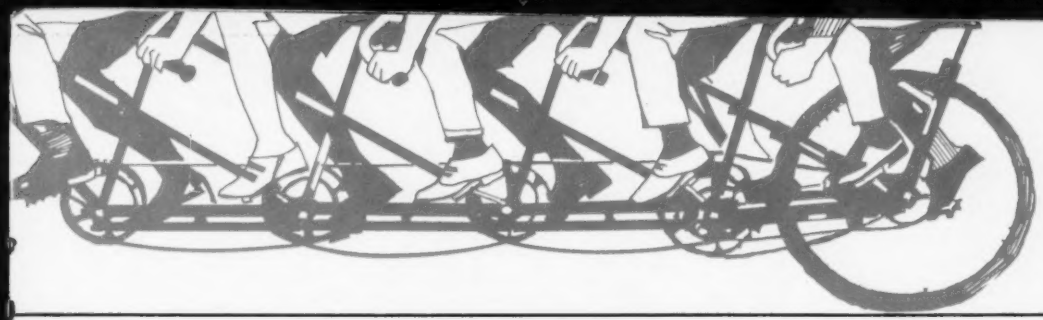
Be sure you know which lever controls which brake before beginning your first ride. The rear brake should always be applied first. If you should accidentally depress one lever and it is for the front caliper brake, you may find yourself flying over the handlebars.

Bike riding requires smooth movements, with the legs exerting force on both the downward and upward movement of the pedal and all of the body muscles working in conjunction with the legs.

PEDALING SAFELY

The main cause of bicycle accidents is the bike rider himself. A cyclist is more likely to run into a car than to have a car run into him. Many beginners do not realize that a bicycle falls under the same restrictions and regulations as those that govern the automobile. Most vehicle code manuals say something such as this: "Every person riding a bicycle has all the rights and is subject to all of the duties applicable to the driver of a vehicle." This means speed limits, traffic signals, stop signs and direction of travel.

- Always ride with the traffic (unless you live in one of the few states where the law requires otherwise). Riding with the traffic reduces the relative speed difference between you and the auto traffic.
- Never ride on a city street where parking is not allowed. There isn't enough room for you between the traffic and the curb, and you could be squeezed to the point where you have no place to go. Be especially alert for buses since they pull over to the curb frequently and may not see you.
- Watch your speed. This may sound silly to the novice, but with a 10-speed you can easily maintain a speed of more than 20 miles per hour. On a crowded city street, this may be much too fast.
- Keep a watchful eye on parked cars. A door suddenly opening ahead of you can force you to veer into the stream of traffic, and that can be bad news. Eugene A. Sloane, in his new book "The Complete Book of Bicycling" (Trident Press, New York), says he has trained himself to watch parked cars for a block ahead, and to notice what's going on in all the parked cars on that block. He watches through the rear windows and looks at the sideview mirrors. This will help you to know if someone is about to open a door.
- Practice accurate steering. On a city street, the clearance between traffic and parked cars is sufficient only if you can cycle straight.
- Keep your eyes moving, just as you would in your car. Turn your head frequently to check traffic behind you.
- In heavy traffic, position your hands on or next to the brake levers so you can stop quickly.
- Even if you have the right-of-way at an intersection, yield it unless you



Inspect your bike before every trip. Check tires, rims, brakes.

are positive you have been seen by motorists and they are going to stop.

- Signal turns and stops well in advance, using the usual hand signals.
- Never ride in areas meant for pedestrians, such as crosswalks or sidewalks. If you want to use such an area, get off the bike and walk. Always yield to pedestrians.
- Before you begin regular commuting, plan your daily route carefully. Get a large-scale map of your city and select streets that parallel main arteries, where stop signs will be in your favor but carrying less traffic. Go out of your way to avoid dangerous intersections. Check out the route when you have ample time. Notice potential hazards such as storm drains with grates.
- Dogs can be a terror if your route takes you through the suburbs on the way to town. Change your route if you have this problem. It's not worth fighting every day.

Commuting on a bicycle can be safe, healthful, and money-saving. Eugene A. Sloan, the author mentioned above, commutes 25 miles a day on his 15-speed, rain or shine, and has been doing it safely for years.

MAINTENANCE

Both the three-speed and the derailleur types require careful adjustment and regular attention for proper operation and safety. Lack of maintenance can cause slippage in the three-speed unit, or result in either the chain jamming or coming off the sprocket of the derailer unit. The manufacturer's recommendations for lubrication and adjustment should be followed precisely. Anything other than minor adjustments should be performed only by someone knowledgeable and experienced. Under no conditions should the three-speed hub be disassembled by a novice. The gear shift cables should be lubricated regularly and inspected for fraying and binding.

The derailleur can only be shifted while the crank and wheel are in motion. Pedal pressue must be reduced. Forcing a shift can damage the mechanism and stretch or break the cables. Back pedaling the derailleur can unseat the chain. If the unit doesn't shift properly, stop and determine the cause. You may save yourself some inconvenience and expensive repair work.

These bikes are equipped with narrow tires which carry pressures ranging from 50 to 80 pounds. Because of the high pressure and the natural porosity of rubber, tires will lose pressure. Until you can accurately "feel" the pressure, use a gauge. Avoid over-inflation when using an air pump. Under-inflation can damage the tire, tube and rim. Check your tires weekly for cuts, imbedded cinders, glass, sidewall cracks. Never use tools to make repairs or you will damage the tire or tube. If you are not experienced, your best bet is to return the bike to the dealer to have the tire dismounted and repaired.

If you are serious about bicycling and taking good care of your bike, you will want to read a good reference book such as "Bicycle Digest" by Mark Tiffault (Digest Books, Inc., Northfield, Illinois).

THEFT

Bike stealing is a national scandal. If you cannot make positive identification of your bicycle through a registration number or an etched mark (such as your Social Security Number), you will not be able to recover your bike even if the police manage to turn it up.

Never leave your bicycle outside, even for a minute, unless it is locked. At home, keep it in a locked garage or in the house.

Most bicycle locks are almost useless because they can be cut with a pair of common wire or bolt cutters. The few that are absolutely thief-proof are also so heavy that no one would want to carry them around (10 pounds or more) but they are useful at home. You will have to look around for something good enough to withstand the thief's bolt cutters but light enough to carry.

THE FLYING ANGEL

EVEL (KNIEVEL)... SUPER (JOE ELSINORE)... LUCKY?

Debbie Lawler—The Flying Angel.

Certainly not "Evel"—dazzling Debbie Lawler is a super-champion motorcycle jumper and you might say she's awfully lucky

Ever wonder what you'd do if you were a high-fashion model and one morning you woke up and modeling turned you off? Well — you could always become a motorcycle jumper and break Evel Knievel's record* — that is, you could if you relish excitement the way delightful Debbie Lawler does.

Appropriately known as "The Flying Angel," the petitely attractive Ms Lawler has been "jumping around" for a couple of years. But she recently gained national prominence when her record-setting indoor jump over 16 cars was televised live from the Houston Astrodome.

You might think the switch in professions from fashion modeling to motorcycle jumping would be a bit drastic. But it wasn't all that big a deal for Debbie since she has 11 years of motorcycling experience tucked nicely into her protective leathers on every jump.

The 5′2″, 105-pound Phoenix resident comes from what might be described as a motorcycling family. As Debbie explains it, "My father is a motorcycle enthusiast and ex-racer who was blessed with three daughters. So he just turned all of us into motorcycle riders—and pretty good ones I might add. My sister is a terrific rider—much better than I am. But she would never jump," Debbie smiles.

Most young people would give anything to be making it as a model. So why would a 19-year-old girl (Debbie is now 21, having been jumping for 2 years) give up an exciting, glamorous, and relatively safe life as a model? Well, mainly for something a lot more glamorous and exciting.

"The money is nice—but mainly it's the excitement. I can't really explain how thrilling and gratifying it

**The record Debbie actually broke on her Houston jump was that of Gary Wells. But she also surpassed any indoor jump Evel has done.*

continued

is every time I shoot off the ramp and into the air and know I've made it again. It's really a natural high getting up there," Debbie explains.

"I also like being my own boss. Modeling is like any other job, it can be a bore and a hassle. But now I can go and do what I want where I want. And I don't have to get up in the morning—I love everything in life but getting up in the morning. But most of all I enjoy traveling and meeting all kinds of neat people—especially handsome young men . . . that's the big thing to a young lady as eligible as I am," Debbie emphasizes.

And what about the dangers of motorcycle jumping?

"Oh, I'm dreadfully afraid of snakes and bugs, but jumping doesn't scare me at all. I've trained myself thoroughly for jumping and I always have a positive attitude because I know I'm ready and my equipment is perfect when I go for the ramp. And, of course, I always wear my lucky orange bra—I never jump without it. I've had famous people trying to get that bra and even a museum is after it. I'll give them a bra like my lucky one, but I just can't jump without the real one."

People are always asking Debbie what it's like to jump and what she thinks about as she does it. But she says she just doesn't know. "I'm concentrating so much on hitting the ramp correctly that I'm not aware of the crowd or anything else. All I know is there's nothing in the world better than knowing I've done it all right when I hit the ramp coming down."

"You know, that's one thing about a lot of motorcyclists that really bugs me. They think riding a motorcycle is just like sitting nonchalantly in a car and cruising down the road—well it's not. You have to know what's happening all the time—*anytime* you're on a bike. Like if I'm off my speed by one mile-per-hour when I hit the ramp I will be off by about 20 feet when I come down. That's serious—but for the average street rider, failing to concentrate on the road can be even more serious."

Surprisingly, Debbie no longer practices her art. In her profession, practicing could be very dangerous. But besides her 11 years of riding experience, there are two things that the lightweight champion says have made her a safe motorcycle rider and a very safe jumper.

"Two basic things my father taught me when I was learning to ride around home in Medford (Oregon) was that you have to respect your machine and you have to respect yourself. By respecting your machine you have to know how it works and keep it working right. By respecting yourself you have to know how to ride, ride safely, and protect yourself at all times."

Debbie says a lot of people call her a "safety freak," but that doesn't bother her a bit. "If I wasn't safety-oriented in this business, I wouldn't be in it long. But you know, I've really been like this ever since I started riding. I'm very proud to say that I have never ridden without a helmet. Even when I was 10 years old my father made me wear a helmet. Helmets are the most important thing for riding. I believe in full-coverage helmets—mainly because my helmet has saved my life several times.

"A very good example is one time when I was jumping in Wichita, Kansas, and misjudged my ramp speed because of a 25 mph wind. I knew I was going to overshoot, but there wasn't much I could do about it. I hit and the bike was wrenched from my hands—the handlebar brace came up and smacked me right in the front of the helmet. It cracked the helmet—believe that—really cracked the helmet. Well you can imagine what that

continued

Debbie Lawler after her record-setting Astrodome jump.

"I'm amazed at how little many riders know about their bikes and how little maintenance they perform."

"You have to know what's happening all the time—ANYTIME you're on a bike."

"By bugging car drivers some riders encourage bad attitudes toward motorcyclists."

would have done to my face if I hadn't been wearing a full-coverage helmet.

"You know I get into all kinds of trouble with my motorcycling friends when I say this, but I believe in helmet laws. You know why? Because when you don't have the laws, people don't wear helmets and so many good-looking guys get themselves all messed up. And that really bothers me because I'm just so single."

Although Debbie believes in helmets, she's just as turned on to other protective riding gear.

"My bones break very easily and this isn't real cool in my business. So I really protect myself. Like I always wear full leathers, gloves, and especially the big motocross boots—a lot of people kid me about how unfeminine these boots are. But I like to think I'm very feminine and want to stay that way. That's why I wear the boots—they can save legs.

"I guess a lot of people are turned off to protective gear because of the cost. But you don't have to have $75 boots, a full set of leathers, and the most expensive helmet available. I'd certainly buy the best helmet I could afford, but there are plenty of fully-approved helmets around for about $25. And as far as boots, any heavy boots give plenty of protection—just like a pair of heavy pants and a thick riding jersey are good substitutes for leathers. When you get right down to it, you can protect your bod pretty well for a lot less than $100. And if your protection isn't worth that much to you, you shouldn't even be on the road because your attitude presents a hazard to safe and conscientious riders and drivers.

"I really think it should be mandatory that everyone who buys a bike should have to get all the riding equipment that goes with it. I'm talking from experience—in 11 years of off-roading, street riding, motocrossing, and jumping, I've never had anything worse than a couple of broken fingers and some broken ribs* and I've gotten off hard more times than I care to remember."

Debbie's love for motorcycles and her involvement in safety has led her into working with motorcycle films. She also did some motorcycle safety spots for the Houston police while there for her Astrodome jump. But most of all, Debbie would really like to get involved in setting up riding schools and producing motorcycle films that could help make motorcycling a safer form of transportation. Although Debbie hasn't gotten into these projects yet she does know what she would stress in them.

"The very first thing I'd do would be teach respect—like I mentioned before. Knowing your bike mechanically is essential. I'm amazed at how little many riders know about their bike and how little maintenance they perform. Some people don't even do simple but essential things like lubing the chain and checking the tires regularly. Now I'm no wrench, that's why I have mechanics check my bike before each jump. But I can look my bike over and know if the basics are right and that's what's important.

"As far as riding, here again I would stress the respect—knowing how to ride and riding safely. It's surprising how many people are out on the street right now who don't really know how to ride. It's no wonder there are so many bike accidents. Riding instruction schools are a big help—unfortunately there aren't that many around. But there are some really good books and articles on motorcycling written by some very qualified people. For some reason, people think that reading a book about how to ride a motorcycle is 'mickey mouse.' But whenever you want to learn about any other subject, the first thing you do is some reading about it—right?"

Debbie also recommends learning

Debbie's most serious injuries occurred this year at the Ontario Motor Speedway, Ontario, Caliornia, when a 25 mph wind caused her to overshoot the ramp. The fact that Debbie received only temporary back injuries in this serious crash is evidence why she believes in motorcycle safety equipment.

"As far as off-road riding, most of the same principles of safe riding apply."

to ride by setting up your own courses in your backyard or in a parking lot. "With a mini-road race course in a parking lot you can have a ball while really learning to brake and corner with no traffic around. Proper braking is so important, but there are riders who just don't know how to brake. A lot of people are amazed at how fast I stop after my jumps—but there's no trick to it. I just get on both brakes at the same time. I'm not afraid to clamp on the front brake like so many people are. It just takes a little practice to learn to use the front brake and I would urge every street rider to really know how to use the front brake before tangling with traffic.

"One important thing a street rider can do to really help his image and ultimately his safety is to become part of the traffic and not something alien to it. What really bugs me is these guys who whip in and out of traffic, making all kinds of noise and aggravating people. Riders who squirrel around in traffic really bug me and I'm a motorcyclist. And the worst thing is that when these people cut in and out and ride crazily they are thinking 'freedom, oh, what great freedom.' But they are not only endangering their lives as well as other people's, these riders are actually taking our freedom as motorcyclists away. By bugging car drivers they encourage bad attitudes toward motorcyclists as well as laws limiting our freedom.

"I think the most important thing for the street rider, other than making sure his bike is in top condition and protecting himself with the correct riding gear, is to remember that the car driver probably doesn't ride a motorcycle and doesn't know what it's all about. So you have to think for the driver and make sure he sees you on the road by lighting up and using brightly colored riding gear. One other tip on street-riding I think is important is staying out of the blind spots. I mean, even a Cadillac can get lost in another car's blind spot, so it's important that you get through a blind spot in a hurry on a bike.

"As far as off-road riding, most of the same principles of safe riding apply. But it's essential to always off-road with a buddy and be sure to have a complete supply of tools and parts with you. And always check the area you're going to ride. I don't make a jump without checking conditions and a racer doesn't race without riding the track, so it's crazy for you to go busting off through the desert without having a good idea of what's out there. And most of all, respect other people's rights and property when off-roading. I love the freedom of riding—freedom is what bikes are really all about. But we've lost a lot of freedom because of the irresponsible way many people ride and act. So I think we should all work to improve the motorcyclist's image so we don't lose any more."

Although Debbie is still recovering from the back injuries suffered in the Ontario crash her enthusiasm for jumping and living hasn't changed. She recently appeared on the Mike Douglas television show and helped Evel Knievel (whom she regards as the king of motorcycle jumping) promote one of his jumps.

Dynamic Debbie plans to be back on her bike jumping again very shortly. But in the meantime she can concentrate on her many hobbies and interests that include acting, scuba diving, and most of all, helping underprivileged children.

And will the "Flying Angel" ever quit flying?

"I guess I'll just keep jumping until I'm too scared to jump—then I'll devote full time to motorcycle safety programs. I love motorcycles and I can't imagine I'd ever get very far away from motorcycling."

Debbie Lawler says she'd also like to spend more time trying to help underprivileged people of all ages and types. "I guess I'll always be into safety and helping people—just as long as I don't have to get up early in the morning to do it."

HOW ACCURATE IS YOUR SPEEDOMETER?

Find out the cheap way

In recent talks with the California Highway Patrol, we learned that a lot of drivers are being cited for exceeding the 55 miles per hour speed limit. Our CHP contact informed us that since the Energy Conservation Law became effective, orders are to enforce the 55 mph limit *to the letter*. If a California driver is clocked at *56* mph on a freeway, he or she is eligible to be stopped. Other states are taking similar firm stands on the new speed limits.

Many drivers cited protest that their speedometers indicated that they were driving 55 or under. Patrolmen are aware that many of the people who make this claim are sincere. They realize that a driver would have to be a ding-a-ling to consciously pass a Highway Patrol car while traveling over the speed limit. That's *asking* for a ticket.

Although the driver's speedometer did indicate 55 or under, he is cited for the *actual* speed he was traveling, not for what the speedometer indicated.

A lot of drivers feel that if the speedometer needle isn't fluctuating it must be working properly. Sounds reasonable, doesn't it? But most drivers aren't aware of the conditions which could allow for inaccurate speedometer readings.

DRIVER checked this out—not only with the California Highway Patrol, but also with an authorized speedometer shop where CHP cars

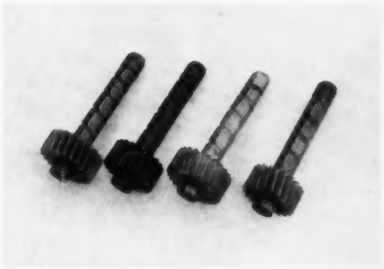
are calibrated regularly for speedometer accuracy.

Basically, there are three things that can cause inaccurate readings on an automobile speedometer:

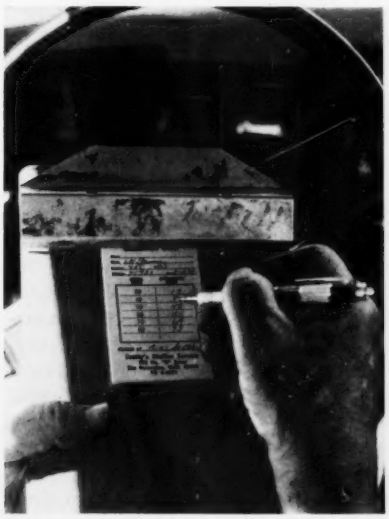
Number one—oversize tires. This is a common occurence. If the diameter of the tires on the rear axle is greater than that of the tires which were on the car as original equipment, the vehicle will be traveling faster than the speedometer indicates. The inverse would apply to tires of a smaller diameter than the originals. This is true of most American cars wherein the transmission is linked to the rear axle. Speedometer readings could be off from three to fifteen miles an hour, but they usually vary from three to ten mph.

A second cause for inaccurate readings might be found in the trans-

continued



Here are four different speedometer drive gears. They are normally color-coded. If an incorrect gear was installed in your car, your speedometer reading will be incorrect.



After the specialist records all the readings, the comparison card is given to the customer. He then knows what his speedometer will read at actual speed of from 20 to 80 mph.

The car about to have its speedometer calibrated is backed onto the dynamometer rollers.

The rear wheels ride between the rollers of the dynamometer as the vehicle is accelerated at speeds from 20 mph to 80 mph.

The speedometer specialist records the readings on a special comparison chart which shows the differences between the speedometer readings and the dynamometer readings.

mission. If the rear end axle ratio is off, the speedometer reading will be off. If any changes are made on the transmission, or if a rebuilt or used one is installed, the speedometer readings should be checked.

A third cause for inaccurate readings could be in the speedometer drive gear, a small plastic gear which is installed in the transmission and drives the speedometer cable. At times, this problem is found in cars fresh from the factory. The number of teeth on these color-coded gears varies. If an assembly line worker should install the wrong gear, the speedometer reading will be affected.

It's simple to find out if your vehicle's speedometer is giving you accurate readings. Many garages are equipped to check it out in a matter of minutes. The cost is minimal—in the neighborhood of $2.5O. Here's how it is done.

Your car will be backed onto what is called a dynamometer with the rear tires resting on a set of rollers. The rollers are connected electronically to a portable, upright panel which displays several calibration instruments. For our purposes, the main one is a large speedometer.

The mechanic charts readings on a comparison card, which is later given to the customer. It shows the actual speedometer readings as opposed to the true speed dynamometer readings. The readings are taken in increments of 10 miles per hour—from 20 to 80 mph. If the readings don't match, something's wrong. It doesn't take long to pin down the culprit—tires, transmission, or speedometer drive gear. It's most likely the problem is caused by one of the three. Whether or not you decide to correct it, you still know how far off your speedometer is. Therefore, you can adjust your speed and compensate for the inaccurate readings.

The dynamometer test doesn't work for front wheel speedometer drive vehicles like VWs, for example. But they can be checked by using the "fifth wheel" method wherein a fifth wheel is attached to the rear bumper and the test is conducted on a road surface. The California Highway Patrol's vehicles are checked in this manner. It's somewhat more accurate, but it takes two men to conduct and it costs a bit more accordingly.

Readings are taken in increments of 10 miles per hour.

The speedometer on the dynamometer can be set so that the meter shows the speed as indicated, or the speed reading is determined by doubling the mph shown on the meter.

If the speedometer is off and the trouble is not in the tires or transmission, then the speedometer drive gear is probably the culprit. Usually the driver is content to know the deviation and adjust his driving speed accordingly, so we're told. But if he should wish to have the gear changed, he is usually directed to an agency which handles his make of car. There, a mechanic can mathematically compute the number of gear teeth it would take to give an accurate speedometer reading. Usually, it's a matter of one tooth more or one tooth less than the drive gear in the transmission.

Our speedometer shop contact said when a speedometer is off it could vary from three to 15 miles an hour, and on occasion, up to 20 mph. These figures also apply to new cars. So the only way to know just how accurately your speedometer reads is to have it calibrated. Both the Highway Patrol and the speedometer shop recommend that the driver have his vehicle's speedometer calibrated every six months. Worn tires, new tires, putting on used tires, or new wheels —any of these could cause an inaccurate speedometer reading. The couple of bucks it takes to have it checked is a lot less than a moving violation could cost. Unlike the dentist's six month's check-up, it takes only a few minutes and it doesn't hurt a bit.

THE NOVICE RIDER—

GIVE HIM A HAND

BEHIND THE HANDLEBARS

A Motorcycle Series by Larry Johnson

Our life style today has become so entwined with motor vehicles that they are more than transportation; they have become eating places, entertainment parlors, and, at times, a place to sleep, or die. Motor vehicles are status symbols and a unique means of attracting attention in the relentless pursuit of one sex by the other. A man (or woman) is not whole unless he or she drives. And, by extension, if you can drive a car then a motorcycle is no sweat. Well, the days of the pilot who can fly anything with an engine, wings, and tail are gone. On the same note there is no similarity between driving a car and a motorcycle except the road you use.

So much for the philosophy. In straight talk a person can't hop on a bike first time out and go full bore. And a new rider, whether he believes it or not, needs to have someone to be a "Big Brother" for him during that first crucial thousand miles. This doesn't mean sitting on his back, but it does mean getting him off in the right direction and with the right outlook. It's a little late (but not too late) to start when the new bike is parked in the parking lot or on the pier. By that time the new owner has the itch. You can spot it by the convulsive flexing of his left fingers and unconscious rotation of his right hand when his mind isn't on his work.

The time to start was when he was looking at other bikes in the parking lot and asking very pointed and searching questions like "How Much?" and "Easy to handle?" and "Do you like high risers or stock?" He's hooked so play him right and you'll have a long time riding partner. Brush him off or overplay him and you may be setting him up. He wants to find out from you if it's as great as it looks. Feed him straight talk about safe wheel track, visibility, weather sense, balance. Put him on the buddy seat and show him how it feels. Show him smooth professional handling. Talk helmets, clothing, defensive driving, courtesy and (to be honest) emergency tactics. Put the bad mouth on "tunnelling," "pumping" at stop signs, "Squirrelling" in heavy traffic, and all those things that make automobile drivers hate "the man and two wheels." Show an interest in his interest; what size bike; what extras; street; dirt; cross-country, and so on. Introduce him to other bikers and talk up the good life. It *is* a *great* way to travel for the guy who goes by the rules.

When the day comes to pick up his bike, go with him. He will enjoy and appreciate an old hand to ride with in that first dice with the traffic. Encourage him, point him in the right direction, teach him to stay alive but don't stand in his way. That's his invitation to go it alone.

But maybe you didn't get to him early. He's not really lost. Everybody wants to belong and guys on motorcycles have got more "belonging" going for them than people in the four-wheel crowd. Two guys on bikes, even in heavy traffic and going the opposite direction, can usally manage to exchange some kind of greeting. Watch! You'll see it all the time. So your novice wants to belong too. "Imitation is the highest form of flattery" so give the new man the best possible example. Make him understand that being "in" means being sensible, mature and responsible, because there's something in it for you. A guy riding a bike who is selfish, discourteous, intimidating or outlaw sets a picture in the mind of an automobile driver that is recalled every time that driver sees two wheels, no matter who is riding them. You're going to be framed.

So, you there, with miles and years of happy cycling under your boots, take that new guy and show him the right way. Help him find the same thrill that you've felt. Give him something more than "four hundred and fifty feet into a parked car" to remember as his high spot on two wheels.

See you 'round.

Larry Johnson

Captain Bruce Mabrito, chosen by the Old Dominion SCCA Region for their "1972 Driver of the Year Award." Bruce holds an SCCA license, and a Federation of International Automobile (FIA) international racing license. Not bad for a parttime racer.

Who says a military career doesn't allow time for motorsports activities? Well, it's certainly not Bruce Mabrito, an Air Force Captain who has squeezed in a lot of racing activity during his leaves and off-duty times during 6½ years in the service. It seems he's done pretty well, too, with a number of second, third and fourth places in Sports Car Club of America (SCCA) races in the B/Sedan category.

Bruce tried oval track competition at Manassas, Virginia, placing 5th overall, but prefers road racing. "An oval track race is certainly a different experience, but not nearly so demanding or exciting as road racing, with its left and right-hand corners, up and downhills, slow and high-speed turns. My training in race cars was at Silverstone and Brands Hatch and therefore I prefer racing at similar circuits, like VIR or Lime Rock, rather than at the big ovals. I would love to race professionally, but sponsorship and my next race car are the big factors. Even though the Datsun Competition Department pays support money for first, second, and third place finishes, it is an expensive sport."

Bruce's background includes racing go-karts in Texas from 1960-1965 and autocrossing and drag racing 1967-1971. He attended "Motor Racing Stables Racing Driver's School," Brands Hatch, England, in 1969, while on leave. He raced a Bobsy Formula Vee in 1970-71 in Wyoming and Colorado while stationed at Francis E. Warren AFB, Wyoming.

Bruce obtained approval from his Squadron Commander through Air Force Regulation 34-4 to road race. The regulation lists the SCCA as an approved agency of racing. He has been an SCCA member since 1969.

Assigned to Turkey in 1973, Bruce still manages to work in some racing. He was in two SCCA races in a rented SS Pinto. He had to travel 15,000 miles round trip to accomplish this, and to keep his SCCA competition license. So, there are problems . . .

Last we heard from Bruce was a note from Europe where he is spending some time en route to a new stateside assignment. We wish him continued luck in his endeavors "In the DRIVER's Seat."

Ed Note: DRIVER has always been your magazine. But you, the reader, can make it even more your mag.

IN THE DRIVER'S SEAT

BRUCE MABRITO

The Datsun which Mabrito drives has a 96 cubic-inch overhead-cam engine, and can exceed 115 mph on straight sections of road racing tracks. The car is similar to the Datsun sedan that BRE races on the 2.5 Trans-Am Series, but, as Bruce points out, "not nearly so quick or expensive!"

Here's how. There's a lot going on out there that we don't know about—but you do. So we're doing this thing called "In the DRIVER's Seat." Its purpose—for you to let us and everyone else know what's happening.

If you've done something unique in the way of autosports, safety, or in any area of interest to DRIVER readers, or know someone who has, let us know. We'd like to put one of you "in the DRIVER's seat" every month. Send your nominations for "In the DRIVER's Seat" to Editor, DRIVER Magazine, AFISC/SEDD, Norton AFB CA 92409

ABOUT MISS DRIVER

(*see back cover*)

Blue-eyed Summer Walk lives up to her romantic name. A student at Eisenhower High School in Rialto, California, she loves swimming and riding. Summer learned about the importance of safe driving when her mother was badly injured in an accident caused by someone else's carelessness.

MINIBIKES

If there's a minibike rider in the house, this is the time of year to review the safety rules with him.

- First, the minibike is an *off-road* machine and must not be ridden on the street. The rider is usually 8 to 14 years old, too young to have a driver's permit, and the minibike is not covered by the family automobile insurance anyway.

But even more important is that the minibike is simply not a road vehicle. It provides a low profile and small size. Usually it has inadequate lights, so the young rider cannot be seen in traffic.

The minibike is noted for its poor handling characteristics. Engineers say it's inherent faults are small wheels, a short wheel base, and minimal capacity in both braking and acceleration. Inadequate acceleration means the minibike is unable to enter traffic safely or keep pace.

The best way to put temptation out of the way of your minibiker is to find a legal and safe area where he can ride. Unless you find him such a place, it is almost certain that he will end up riding on the street.

- Second, require him to wear a helmet and sturdy shoes.
- Third, be sure he receives some instruction from an experienced rider.

If you are the parent of a minibiker, be sure to ask your insurance agent what additional coverage is needed. Don't assume that your homeowners insurance coverage will protect you. It probably will not.

There is no technical or legal definition of a minibike accepted from state to state. The Motorcycle Industry Council considers it a minibike if it is:

A two-wheeled vehicle with wheel rims of less than 10-inches diameter . . .

or with hub-to-hub wheelbase of less than 40 inches . . .

or an engine rated at less than 45 cubic centimeters . . .

or a seat height of less than 25 inches from the ground.

Answer to "WHAT SHOULD YOU DO?"

(See Page 21 before reading)

Even with loss of power assist to your brakes and steering, you can still control your car. It is just going to take extra muscle to steer and use the brakes. Answer "B" is your best choice. Never give up in any traffic situation; stay with it, keep trying, and you've always got a chance.

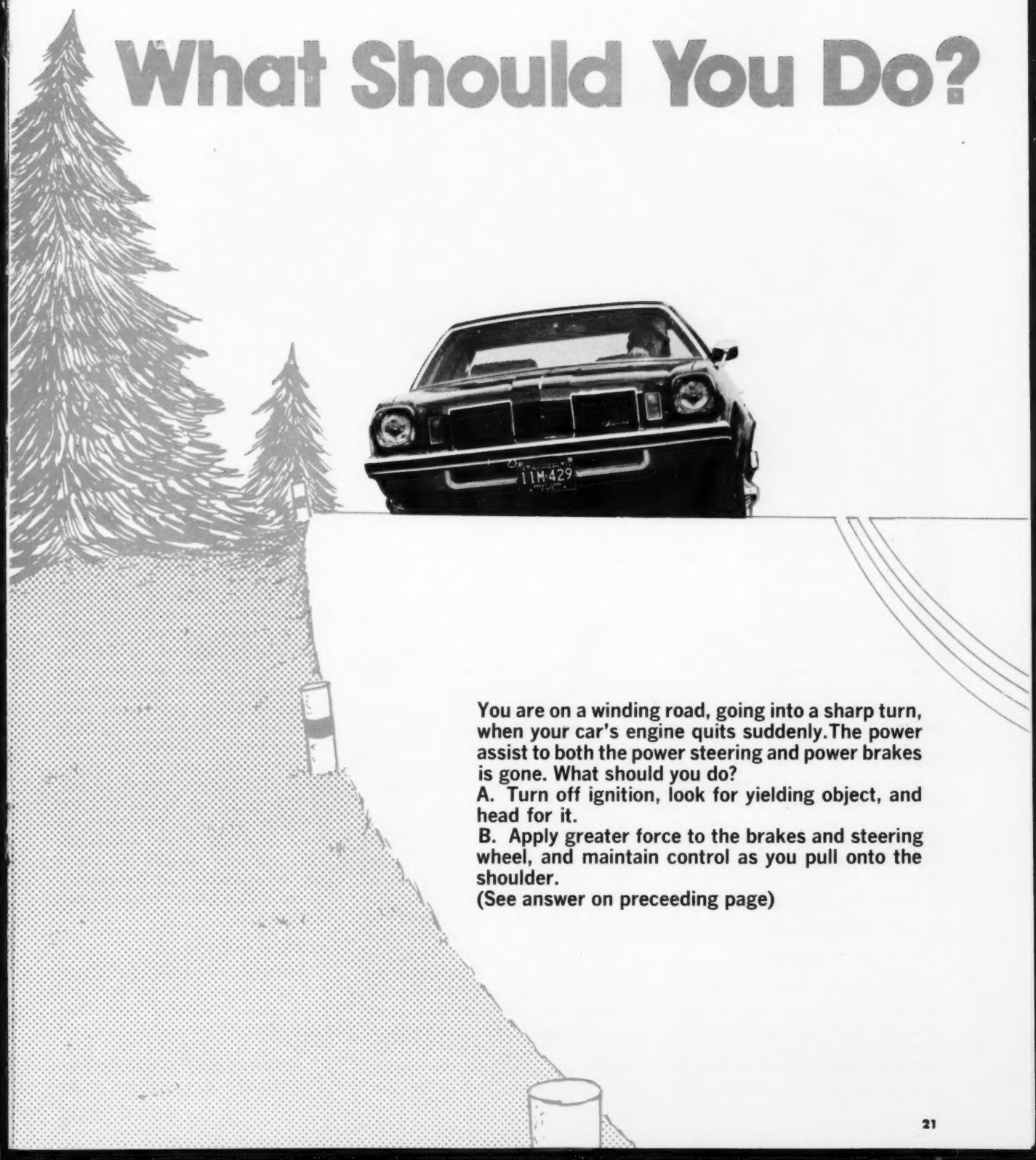
[*Editor's note: Engine stalls, resulting in loss of power steering and power brakes, are not uncommon with today's emission-controlled engines. To avoid an accident, it is extremely important that anyone who drives a car so equipped be prepared to deal with the dramatic stiffening in handling when the engine stalls. A husband, who does not help his wife prepare for this possible emergency, is taking a gamble with his family's safety.*]

"BACKYARD MECHANIC" REPRINTS

The first 12 installments of the popular "Backyard Mechanic" series have been combined into a one-volume reprint and are available for distribution. If you would like a copy, send your name and address to AFISC/SEDD, Norton AFB, CA 92409. A post card will do.

Our supply of these reprints is very limited, so please do not request more than one copy.

What Should You Do?



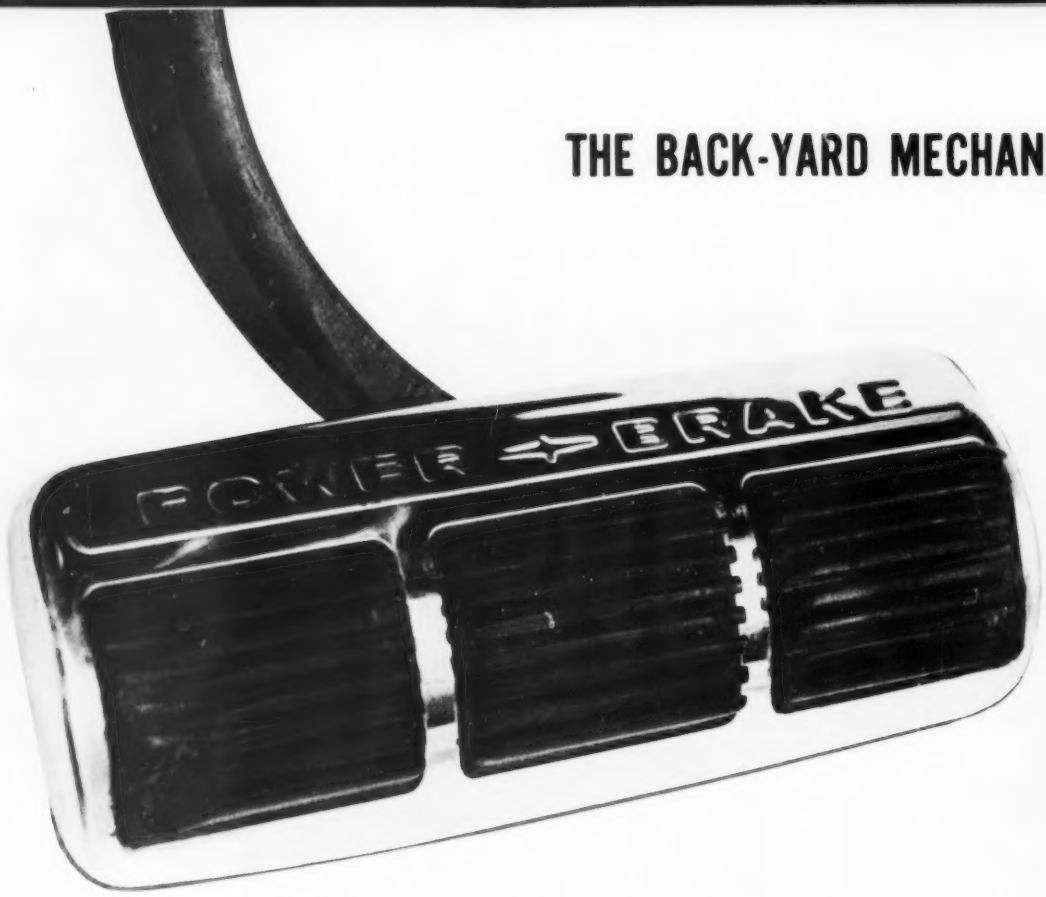
You are on a winding road, going into a sharp turn, when your car's engine quits suddenly. The power assist to both the power steering and power brakes is gone. What should you do?

A. Turn off ignition, look for yielding object, and head for it.

B. Apply greater force to the brakes and steering wheel, and maintain control as you pull onto the shoulder.

(See answer on preceeding page)

THE BACK-YARD MECHANIC



As we threatened last month, we're finally going to finish off brakes in this "Backyard Mechanic." Last time when we discussed the brake hydraulic system, we didn't get to the special valves that are important parts of today's hydraulic systems. So we'll cover these devices briefly before wrapping up brakes with a discussion of power brake assist units.

PRESSURE DIFFERENTIAL SYSTEM

Soon after the auto companies introduced dual-master cylinders to help prevent brake failures, they went one better with brake pressure differential warning systems. These devices are designed to activate the dashboard brake-failure warning light as soon as there is a loss of fluid pressure in the hydraulic system—either front or rear brakes.

Basically, the warning system is a piston assembly with the brake failure light switch attached to it. Fluid from the front and rear brake lines runs through the assembly and holds the piston centralized in its bore because there is equal pressure from each line. If a leak develops in either system (front or rear) however, the fluid pressure decreases and the piston moves off center, triggering the warning light.

This system is great if you develop a hydraulic leak and the light lets you know about it. But as some of you may have discovered, other things can trigger the warning light. In many cases, opening and bleeding the brake system activates the light. And with some cars the lights have a bad habit of coming on when the front wheels are spin-balanced on the car, or for no apparent reason at all.

The first thing some people do if the warning light comes on when it shouldn't is just disconnect the light and forget about it. But the warning system is there for a purpose and having a disconnected light won't do you a lot of good if you do have a brake failure. So it's a very good idea to know how to centralize the piston to turn off the light without deactivating the system. In most cases, the job is easily done—check a manual for the simple step-by-step procedures for centralizing the warning valve on your car. Figure 1 also outlines the basic procedures for most cars.

PROPORTIONING VALVE

On vehicles equipped with front disc brakes and conventional rear drums, a special proportioning valve maintains correct fluid pressure between the front and rear brakes to provide balanced braking. Although the proportioning valve rarely malfunctions, if unbalanced braking that's not attributable elsewhere develops, the inexpensive unit should be replaced. The valve is factory set and no attempt should be made at adjusting the old valve. To replace the valve, simply disconnect it from the brake line and carefully install the new valve making sure the opening marked "R" is toward the rear—not the front.

METERING VALVES

Most cars with front disc brakes also have another special hydraulic valve called a metering valve. The metering valve is installed in the brake line to the front brakes (Fig. 2) and delays fluid pressure buildup to the front brakes until rear brake

WARNING LIGHT SWITCH-OFF PROCEDURES

After repairing and bleeding any part of the hydraulic system the warning light may remain on because the pressure differential valve remains in the off-center position.

A. 1970—1973 Ford products, General Motors cars, Chrysler products and 1971—73 American Motors cars (disc brakes) have a self-centering valve. After repairs or bleeding is performed, center the valve by applying moderate pressure on the brake pedal. This will turn out the light.

B. To centralize the valve on 1967—69 Fords:

1. Switch the ignition on and bleed brakes.

2. If the front brake system was repaired or bled, a leak must be created in the rear brake system and vice versa. Open the bleed screw at one rear brake and have an assistant press the brake pedal slowly until the light goes out. Quickly close the bleed screw.

3. Check brake fluid level and brake pedal height and firmness. Road test the car.

C. To centralize the valve on 1967—1970 (drum and disc) and 1971—1973 (drum only) American Motors cars:

1. Before repairing or bleeding the brakes, disconnect the switch terminal wire and remove the nylon switch terminal, contact plunger spring, and nylon plunger with contact.

2. If the light had come on and actuated the valve, spring pressure may hold the plunger. To release the plunger, apply a small amount of brake pedal pressure.

NOTE: Location of the leak can be determined by the position of the plunger in its bore. The top of the plunger will lean to the side (front or rear) which has the low pressure.

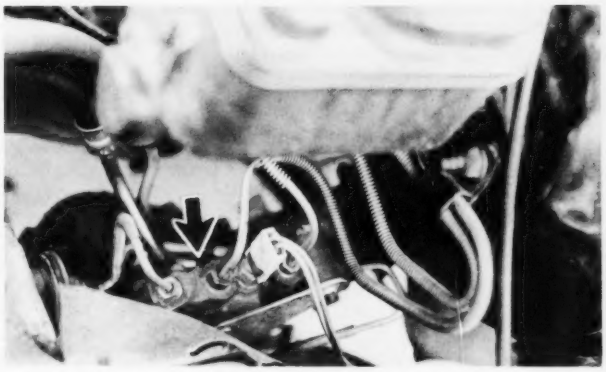
3. Make the repair and bleed the brakes. Install the spring and plunger in the valve with the contact down.

4. Install the nylon terminal and connect the warning light wire to the terminal.

5. Replace the valve assembly if any fluid leaks from the center terminal opening while removing the terminal.

IMPORTANT: The switch assembly is non-serviceable, replace if faulty.

Fig. 1



Most 1972 and newer cars have special units that combine the metering, proportioning, and brake failure warning valves into one assembly located near the master cylinder (arrow). Older cars have separate valves located in the brake lines.

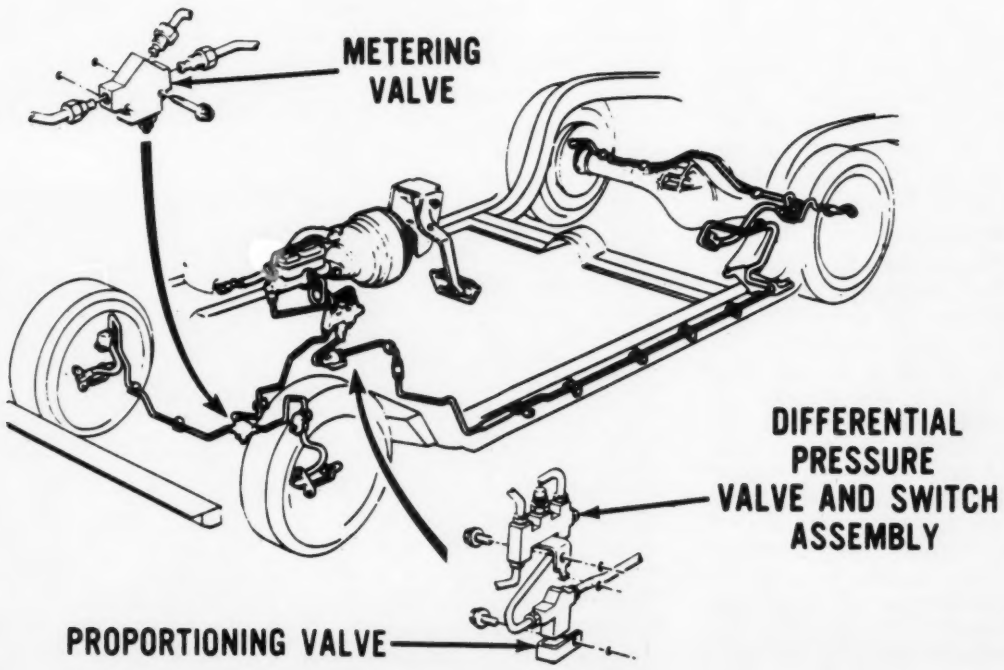


Fig. 2

pressure is at the proper level. Like proportioning valves, metering valves rarely malfunction. However, if the metering valve is not operating properly, unusual stress is placed on the front brakes, reducing braking action and greatly increasing front brake wear.

Check the metering valve by applying the brakes very slowly (engine on). If the metering valve is operating there will be a slight change in pedal pressure at about one inch of pedal travel—it should feel like a slight bump. If the valve is not operating it can be easily replaced by disconnecting it from the brake line and carefully installing the new valve. The brakes should be bled after installing the new valve—as they should be any time the brake system is opened.

COMBINATION VALVES

In 1971 General Motors introduced a valve that combines the warning system, proportioning, and metering functions all in one unit. Ford followed in 1972 with the same type unit and now most new cars utilize a combination-type valve. These combination valves are normally located at or near the master cylinder (check a manual for the location and specifics on your car). The entire unit must be replaced if any of the functions fail. Once again there isn't any trick to replacing this type unit—it's just a matter of disconnecting the brake lines and installing a new unit.

POWER BRAKES

Power brakes and power-assist disc brakes are quite popular today. But most people who pay the extra money to get these options don't know that they aren't getting at all what they pay for. Actually, power brakes are nothing more than a standard hydraulic brake system with a vacuum assist unit between the brake pedal and the master cylinder to help you activate the brakes.

When you hit the brake pedal with power brakes, vacuum from the intake manifold pulls the assist unit piston forward which pushes on the master cylinder activating rod operating the brakes. The fact that you are separated from the master cylinder by the vacuum unit is why you don't have as good a "feel" with power brakes as you do with manual brakes where the brake pedal is linked right to the master cylinder.

OPERATION

Most power brake units consist basically of a piston, control valves, and a vacuum connection from the engine intake manifold. When your foot is off the brake and the vacuum unit is in the released position, the vacuum system intake port is closed. A special atmospheric port remains open to allow air to pass from one side of the vacuum piston to the other. This maintains equal pressure on the piston and keeps it in the off position.

When you hit the brake, the atmospheric port closes and the vacuum port opens. Vacuum from the engine then sucks the unit piston forward against the master cylinder operating rod and actuates the brakes. If the power unit fails or the engine dies, there is usually enough vacuum remaining in the system to give you assisted braking for a few seconds. But after that you're going to have to use plenty of leg power.

The important thing to remember with power brakes is don't freak out if the power fails or the car dies. You can always stop a power-brake equipped car manually in a reasonable distance—you just have to put a lot of muscle on the brake pedal.

SYSTEM COMPLICATED

Unlike many of today's automotive components that seem complicated but aren't, the power brake booster seems simple—but the mechanics aren't. So unless you're a certified brake mechanic and have all of the weird special tools required to do the job, there "ain't no way" you're going to rebuild or repair a power assist unit. The important thing is to know what basic checks to make before hustling down to the local brake shop when you have power brake problems. Nine out of ten times, power brake problems are caused by something very simple that the average person can easily take care of. So let's take a look at some of the basic checks you can make.

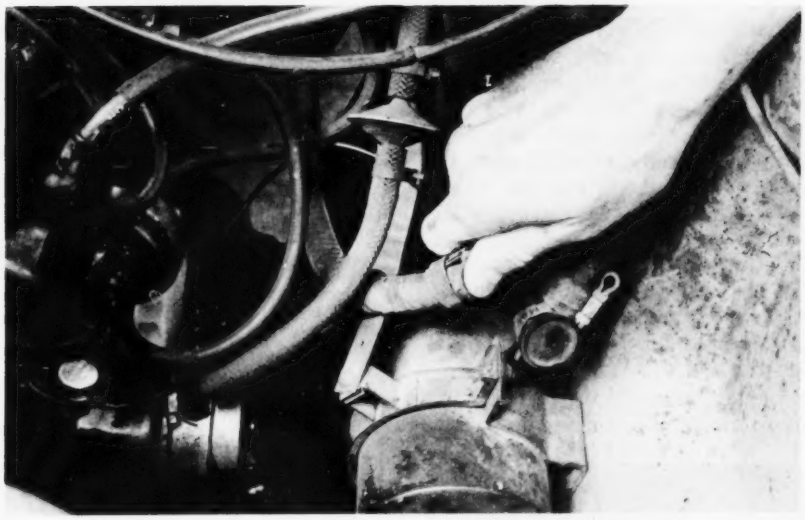
SYSTEM CHECK OUT

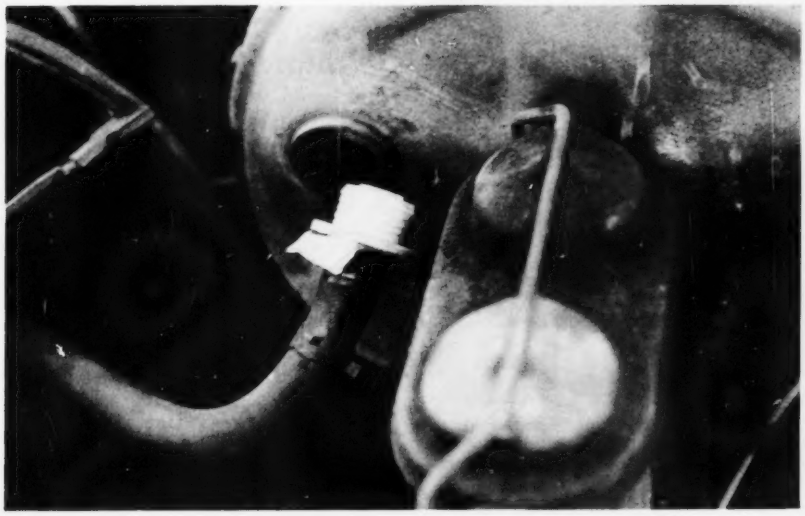
To check the power unit's operation, shut off the engine and pump the

The power brake assist unit is located between the master cylinder and the fire wall. The vacuum check valve on this unit has a special connector where a vacuum gauge can be attached.

Pulling the vacuum line at the power assist and checking for suction is the first step in tracking down a power brake problem.

If there is vacuum at the assist but the unit does not work, the check valve may be malfunctioning. The valve can be pulled from the unit for inspection if care is used not to damage the mounting grommet or hose.





brake pedal about a dozen times to be sure and exhaust all vacuum from the system. Step on the brake pedal and hold it down firmly. Start the engine. If the vacuum unit is working, the brake pedal will move forward slightly as the engine starts. If the pedal stays hard and does not move, the vacuum unit is not functioning.

The first thing to do if the power unit is not working is to make sure it is getting vacuum from the engine. Pull the vacuum hose loose from the power unit (see picture) and place your thumb over the hose. There should be plenty of suction at the end of the hose with the engine idling. If the vacuum is weak, check the hose very carefully for leaks or kinks. Install a new hose if the old one is defective.

If the hose is okay and there is insufficient vacuum, check for vacuum at the intake manifold. Place your finger over the manifold vacuum port, or attach a vacuum gauge. The vacuum gauge should show at least 16 inches of mercury with the engine idling.

Although not very common, if vacuum is low at the intake manifold it's probably because of vacuum leaks. You can check for leaks by putting heavyweight oil on the joints at the carburetor base and intake manifold. If there is a leak, the oil will seal it temporarily and the engine speed will increase. Leaks can be repaired by tightening the bolts or installing new gaskets if necessary.

If there is plenty of vacuum at the hose but the booster unit still doesn't work, the vacuum check valve (see picture) is usually at fault. This valve is a common cause of power brake problems. The check valve is a one-way unit that allows air to be sucked out of the vacuum booster to operate the assist, but doesn't let air back in (vacuum out) when the engine is shut off. If the valve comes loose or fails, vacuum isn't maintained in the booster unit and the power assist can't operate.

Most check valves can be easily removed from the vacuum unit for inspection. Carefully pull (or unscrew) the valve from the unit and disconnect it from the vacuum line.

Test the valve by blowing through it one way and then the other. You

continued

should be able to blow through the end that inserts into the power unit, but not through the end that attaches to the vacuum line. Install a new valve if the old one is faulty, being sure to get the unit placed securely in its grommet.

If the valve is in good condition but the power unit doesn't operate, you better head for the local brake shop or pick up a factory rebuilt power assist unit and bolt it on. As previously mentioned, power assists are hairy to rebuild and should always be replaced with a new or factory-rebuilt unit. A good service manual has the specs on this job for your car.

REGULAR MAINTENANCE

Most power boost units have a filter to clean the air drawn into them. On a few boosters the unit is external and should be periodically removed and cleaned with alcohol—check your manual for the specs. However, most units have an internal filter that should be serviced when the booster is removed from the car.

One final check you can make on the power assist unit is making sure there is no brake fluid being sucked through the vacuum line into the intake manifold. Remove the vacuum hose that runs to the power assist at the manifold and run a pencil around the inside of the open end. If the pencil comes out wet, fluid is leaking past the vacuum cylinder piston. If so, the unit should be replaced. Fluid leaking into the engine will cause it to run poorly, and enough fluid can cause sticking valves and other serious engine problems. Before replacing the power unit, however, check the master cylinder very carefully for leaks. Fluid leaking into the vacuum unit from the master cylinder may be the cause of the excess fluid. In this case the master cylinder should be repaired or rebuilt.

A power brake-related check you should make when checking the brake adjustment is to make sure that the power unit is not causing the front brakes to drag. With the car's front end raised and properly supported (brakes properly adjusted), spin the wheels. Immediately start the engine but do not touch the brake pedal. The wheels should coast to a stop gradually and turn freely. If not, have the vacuum unit checked out by an expert. Figure 3 gives the procedure for checking the automatic adjusters on drum brakes.

The check valve is designed to let air out of the assist unit when the power brakes are operated, but close when vacuum stops. If the valve passes air freely from each direction, it's faulty.

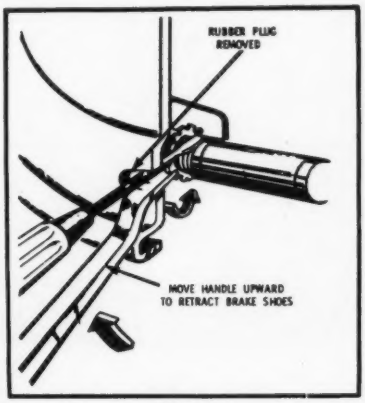


Fig. 3

AUTOMATIC ADJUSTER CHECK

1. Raise the vehicle and support it properly with safety stands. Chock the wheels.
2. Loosen the brakes by holding the adjuster lever away from the starwheel and backing off the starwheel approximately 30 notches (see diagram).
3. Spin the wheel and brake drum in reverse and have a helper apply the brakes. The movement of the secondary shoe should pull the adjuster lever up, and when the brakes are released the lever should snap down and turn the starwheel.
4. If the automatic adjuster doesn't work, the drum must be removed and the adjuster components inspected carefully for breakage, wear, or improper installation.

Leaking brake fluid can be pulled into the engine through the vacuum line. Pull off the brake booster vacuum line at the manifold connection and check the inside of the line for fluid. If the line is wet, the brake assist or master cylinder (whichever is leaking) should be replaced to prevent engine damage.

LETTERS TO THE EDITOR

BACKFIRE

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

SUBSCRIPTION PROBLEMS

I have a subscription to DRIVER magazine; however, I will not renew it upon expiration.

In my opinion, DIRVER is an excellent magazine which has articles that are extremely practical as well as very interesting. The magazine serves a very worthwhile purpose. It's a crying shame that the publisher of such a fine magazine has to be the Government Printing Office.

Yesterday, 20 March, I received the November 1973 issue of DRIVER. Last week I received the December 1973 issue. This has been typical ever since I subscribed, which by the way wasn't easy. It took several letters to GPO to even get my subscription started. Obviously, I feel an investigation of that bureaucratic agency is in order.

SMSgt John W. Caldwell, USAF
115 - 15th Infantry Avnue
Fort Ord, California 93941

We are very pleased you enjoy DRIVER, and equally disturbed by your subscription problems. Your complaint, unfortunately, is typical of many we have received over the past several months. This is why we are printing your letter. We want our subscribers and prospective subscribers to know that there is a problem, and something is being done about it.

Although we have nothing to do with subscriptions at this office, please rest assured we have made this problem known to GPO and were told it will be straightened out.

NOVEL FIRE EXTINGUISHER IDEA

I read the "What Should You Do" column in the January '74 issue and go along with your recommendation to carry a fire extinguisher in your car. But I have another suggestion to make. During the last 30 years I have saved 12 or 15 cars that were on fire by using a soft drink container as a fire extinguisher. Such containers are easy to carry, inexpensive, and efficient. (I have never had to use more than one small bottle to put out some pretty hearty engine fires.)

So, if you don't carry a fire extinguisher, at least carry a soft drink container—preferably a bottle. To use, just pop the cap, shake a couple of times, and direct the spray with your thumb.

Lt Col Gordon R. Links
Commandant NCO Academy
Kirtland AFB, New Mexico 87117

SHOULDER BELTS IN THE REAR SEAT

In your September 1973 issue (excellent as usual), a reader bemoaned the fact that rear seat shoulder belts are not available in autos.

I have seen them in Volvo station wagons, and in other imports as well. Some, including BMW, even have rear seat head restraints.

When I ordered my 1970 Dodge Dart, rear seat shoulder belts were an option, which I declined because my two children would be in GM and Ford safety seats for a few years. Now that they are older, I will install them myself.

Mr. Richard F. Campagna
Safety Specialist
Hdqts U.S. Army Tng Ctr, and Ft. Dix
Ft. Dix, New Jersey 08640

You are right, rear seat shoulder belts are an option on most cars.

ONE OPINION OF MOTORCYCLISTS

One of your readers commented in a letter that he can't understand why motorcyclists are not accepted by the general populaion. In my opinion riders will not be accepted as a part of the responsible driving community until motorcycles become safer, quieter, and are no longer vehicles of environmental destruction. In my humble estimation most motorcycle riders don't give a tinker's dam for the feelings and property of others as they roar—and I emphasize roar—on their way.

Mr. Emmett Joseph
3030 Blue Green Drive
Dayton, Ohio 45431

I think your comments apply equally to the way the general public felt about drivers when the automobile first "roared" onto the American scene. And, although there are irresponsible, insensitive motorcyclists on the road, as there are car drivers, the bad guys are in the minority.

Your view of motorcyclists may be helpful to the motorcyclist in knowing some of the prejudices he is up against. But let's give the motorcyclist a fair chance, and acknowledge the majority group of riders who ride safely, quietly, and treat the environment with respect.

"VISIBLE IS ALMOST INVINCIBLE"

I thought your December motorcycle article, "Visible is Almost Invincible" was extremely well written and informative. I would like to add a few pointers that I have picked up over many years as a cycle rider.

You mentioned placing reflective tape on the bike and on your clothing. I have a non-reflective helmet and placed a strip of the tape on each side. This is a good idea even if you have a reflective helmet because the tape reflects brighter, and really broadcasts a message to other motorists.

continued

continued

BACKFIRE

Another good safety device is the small plastic reflector, which is now standard equipment on newer bikes. If your bike is not so equipped, I highly recommend you buy and install several of them. They are cheap, easy to attach, and really show up your bike to drivers of vehicles approaching from the side.

I feel the most important safety device, though, is the ability to be a defensive driver. You must learn to approach every situation with extreme caution, anticipate unlawful maneuvers by other drivers, and always stay alert for the unexpected.

SP5 MATTHEW SKIDMORE, JR.
HHB, 32d AADMOC (G4)
APO New York 09227

DANGEROUS PRACTICES IN THE MOVIES

Doesn't it give you a sick feeling in your stomach when you see an actor-driver in the movies turn his head and eyes away from the road for several long seconds to carry on an involved conversation with his front seat passenger? The actor may be playing the part of a hero policeman, doctor, or just plain Jim. The point is that such practices in the movies and on TV are unconsciously adopted by some of the viewers.

I wish something could be done to get movie producers to insist that their actors playing driver roles keep their eyes on the road and their attention on their primary task of driving.

Mr. James L. Molloy
RR #5
Elizabethtown, Kentucky 42701

Perhaps your letter will do some good, Jim. You might want to direct a copy to those who have some control of this, such as the Directors Guild of America Inc., 7950 W. Sunset, Los Angeles, California 90046.

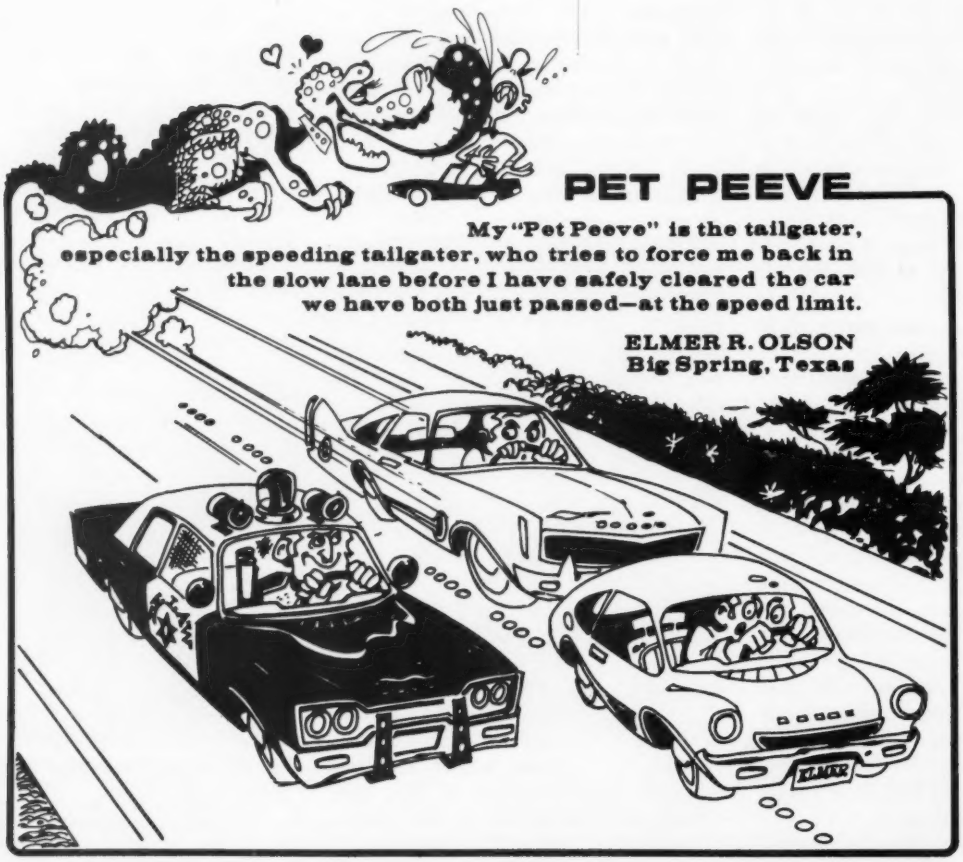
CHOKE TIP FOR DODGES

I would like to add something to your automatic choke article appearing in the December 1973 DRIVER.

As the driver of a 1969 Dodge, I have had a choke problem longer than I care to admit. It is a "well" choke heated by the exhaust system. There is one port on each side of the intake manifold, and the ports are fed from the exhaust. For some reason the ports stop up with carbon and/or a gummy substance. This not only prevents a flow of heat, it forms an insulation around the well of the choke housing, preventing proper operation. The blocked ports also restrict adequate heat from reaching the carburetor. I have learned that this is a major problem with 1966-69 models as well as some '70 and '71s used mostly for city driving.

MSgt Robert L. White
3d Mobile Comm Group
Tinker AFB, Oklahoma 73145

A good tip. Here's where some automatic choke solvent can work wonders.


PET PEEVE
My "Pet Peeve" is the tailgater, especially the speeding tailgater, who tries to force me back in the slow lane before I have safely cleared the car we have both just passed—at the speed limit.
ELMER R. OLSON
Big Spring, Texas
ELMER

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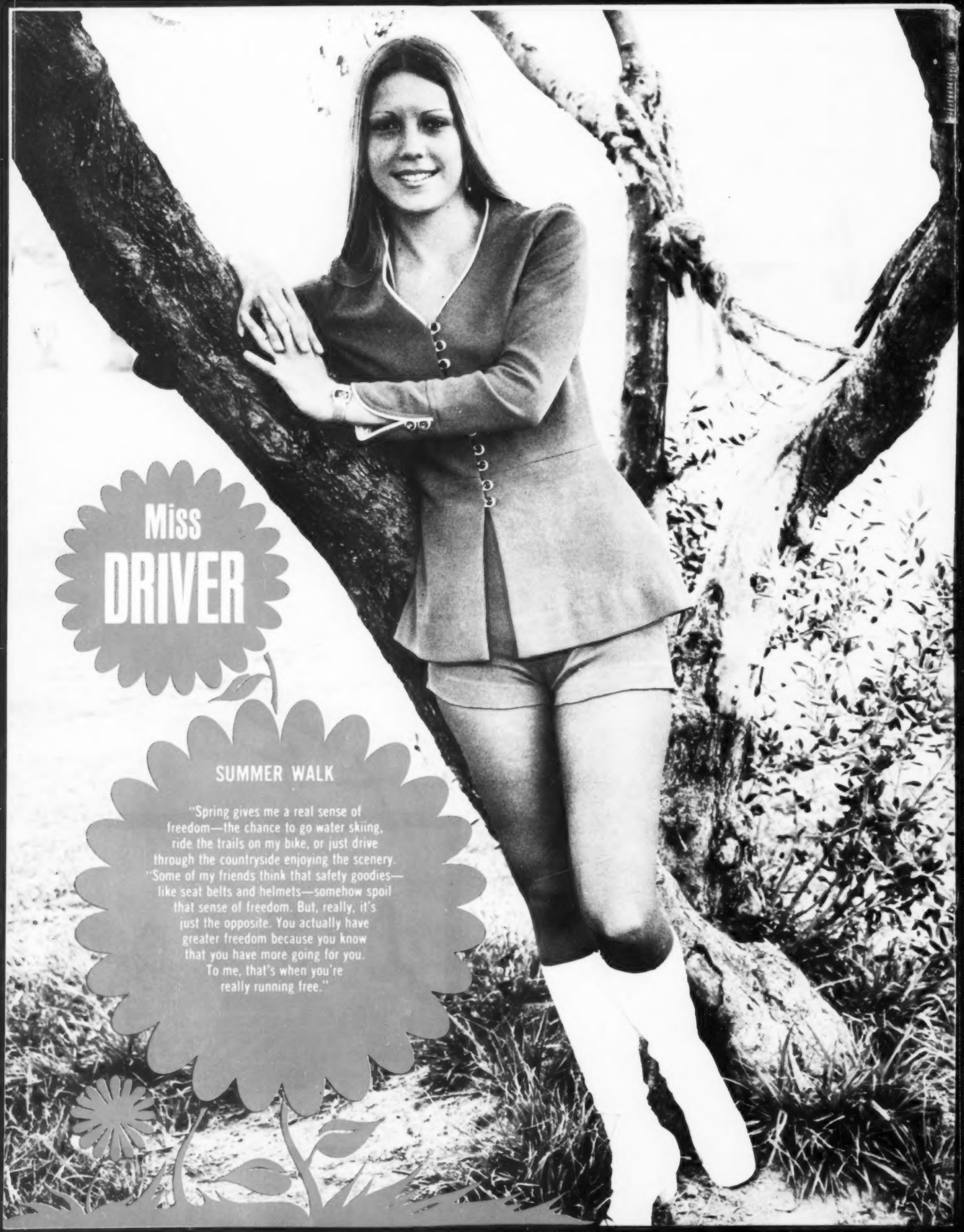
TUNEUP

"Yeah, Bill . . . I figure it's just about time to give the old buggy it's annual tune-up."

"Thank goodness the energy crisis is over."


Miss
DRIVER
SUMMER WALK
"Spring gives me a real sense of freedom—the chance to go water skiing, ride the trails on my bike, or just drive through the countryside enjoying the scenery.
"Some of my friends think that safety goodies—like seat belts and helmets—somehow spoil that sense of freedom. But, really, it's just the opposite. You actually have greater freedom because you know that you have more going for you. To me, that's when you're really running free."